LABORATOIRE FRANCIS PERRIN
CEA/DSM/IRAMIS/SPAM - CNRS URA 2453

SEMINAIRE SPAM / LFP

Prof. Stefan HAACKE

Institut de Physique et Chimie des Matériaux de Strasbourg

Le jeudi 8 Octobre 2009 à 11h00
Bâtiment 522 - Salle 138

«Ultrafast spectroscopy of tryptophan as molecular probe for protein dynamics in the condensed phase»

Light is used by bacteria as energy source (photo-synthesis) or for orientation (photo-taxis).
On the molecular level, proteins are driving the underlying often complex bio-chemical machinery, and an ultrafast photochemical process is the starting point of these processes. In photo-sensory proteins, like the visual photo-receptor rhodopsin, this involves photo-isomerisation, but more and more examples are known where photo-induced charge transfer is the energy-converting process.
The present talk will review the recent progress made in understanding the ultrafast photo-physics of bacteriorhodopsin, the key element of archaebacterial photo-synthesis. Our focus is on the light-induced dipole moment change, and how this can be measured via the response of tryptophan amino acids [1,2].
When the photo-physics of rhodopsin's retinal is mimicked in artificial, computer-designed molecules, interesting new model systems are obtained, the so-called indanone-pyrollene photo-switches. We will show that their photo-reaction occurs coherently, i.e. in concert among the ensemble of molecules, within half a torsional period [3].
On the way of exploring new ways for using tryptophans as molecular probes in protein/DNA complexes, we have been revisiting tryptophan's excited state quenching in aqueous solution. Quenching leads to a primary photo-product, with a well-defined absorption band at 425 nm. In contrast to previous nanosecond photolysis experiments, it has now been possible to follow the sub-nanosecond formation dynamics of this photo-product, shedding new light on its molecular nature [4].

[1] "Probing the Ultrafast Charge Translocation of Photoexcited Retinal in Bacteriorhodopsin", S. Schenkl, F.van Mourik, G. van der Zwan, S. Haacke, M. Chergui, Science 309, 917-921 (2005).
[2]"Functional electric field changes in photo-activated proteins revealed by ultrafast Stark spectroscopy of the Trp residues", J. Léonard, et al., Proc. Nat. Acad. Sci. USA, in press (2009).
[3] "An artificial molecular switch that mimics the visual pigment and completes its photocycle in picoseconds", A. Sinicropi, et al., Proc. Nat. Acad. Sci. USA, 105,17642-17647 (2008).
[4]"On the Nature and Formation Dynamics of Tryptophan's Primary Photoproduct in Water Solution", D. Sharma, J. Léonard, S. Haacke, submitted.

Formalités d'entrée :

Visiteur U.E. *: Se faire connaître au moins 48 heures à l'avance pour l'établissement de votre autorisation d'entrée sur le Centre de Saclay.*
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Sans autorisation, vous ne pourrez entrer sur le Centre de Saclay. Tél. : 33.1.69.08.30.95 - Fax : 33. 1.69.08.76.39 - email : caroline.lebe@cea.fr ou veronique.gereczy@cea.fr
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